Undersea Weapons Program

ONR Program Code 33 — August 2008

At a Glance

What is it?

- The Undersea Weapons Program develops offensive and defensive technology options to enable next generation weapons capable of engaging submarines, surface ships, and threat torpedoes. The science and technology efforts focus on improving guidance & control capabilities, probability of kill and probability of counter-kill, increasing weapons lethality and load-out, and reducing total ownership costs.

How does it work?

- The program is divided into 6 distinct thrusts: Guidance and Control, Multidisciplinary Systems Design and Optimization, Propulsion, Undersea Warheads, Counterweapons and Countermeasures, Super-cavitating Weapons, and the University Laboratory Initiative.

What will it accomplish?

- The program is expected to enable next-generation undersea weaponry, offering the Navy great tactical advantage for Anti-Submarine Warfare (ASW) and Anti-Surface Warfare (ASuW) scenarios.

Point of Contact

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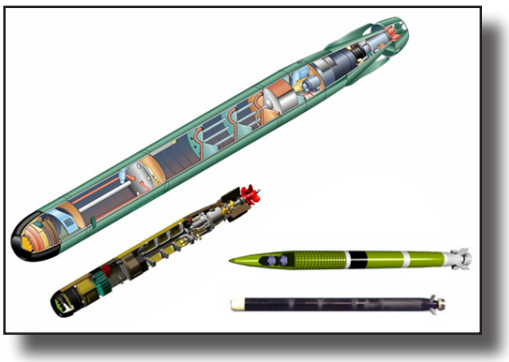
Designated as a National Naval Responsibility, the development of the next generation undersea weapons has long been a responsibility of the ONR. As such ONR has invested and maintained a robust basic and applied research program.



The Undersea Weapons Discovery & Invention program has six research thrusts:

- *Multidisciplinary Systems Design & Optimization: provides the framework and design tools, including physics based models and cost estimates, for weapons design and optimization. It also includes the noise control and propulsion components.*
- *Guidance and Control: focuses at signal processing to extract target features, and sensors for detection. Environmental condition, weapons, and targets are simulated and modeled to assess the weapon performance and engagement.*
- *Warhead effort: MEMS safety and arming techniques and devices, torpedo vulnerability assessment model, and development of composite electromagnetic fuze, underwater explosion computer codes (to simulate the effects of close-in underwater explosions against naval structures) and new warhead concepts, such as directed blast warhead and detonation merging warhead.*
- *Counterweapons and Countermeasures: focuses on acoustic and non-acoustic detection of high-speed weapons, development of supercavitating projectile, and understanding of the physics of and techniques for catastrophic de-stablization of supercavitating weapons by cavity disruption.*
- *Supercavitating Weapons: aims to understand the supercavitation physics, and control of supercavitating bodies. Control algorithms, controller, and control devices are developed. Homing sensors and techniques are also developed.*
- *Education & training: To maintain and revitalize the future workforce in undersea weaponry, a University and Laboratory Initiative promotes the education and training of graduate undersea weapons. The graduate students are working with the Navy Lab mentors and guided by their college advisors.*

The Undersea Weapons Program provides high performance and cost effective weapon systems. High-Speed Supercavitating Torpedo could be very effective in sub-on-sub engagements at very close range. The reduction in response time could potentially enable the submarine to destroy a threat before that threat could counter-fire or deploy countermeasures. Such high-speed weapons would also provide a clear tactical advantage in an anti-ship weapon for long-range maritime interdiction missions.

Research Challenges and Opportunities

- *Game Theoretic Operational Assessment of UUV and Weaponry*
- *Stealth Torpedo*
- *Design & Optimization*
- *Hybrid Propulsion*
- *Supercavitating Weapons*
- *Advanced Warheads*